The Informational Temperature of the Text

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Concrete poetry has been accused of impoverishing language. This rebuke has often been made in almost apocalyptic terms, with some accusers speaking of "willful castration," and others going so far as to threaten the launchers of concrete poetry with a "stay in Dante's Hell."

All artistic discipline implies a voluntary limitation of means. In poetry this can be seen in the *terza rima* of Dante, or, even more pronouncedly, in the rigorous melopoeic texture of Arnaut Daniel's *sestinas*. In both examples, the expressional form chosen drastically limits the poets' linguistic options. But without delving further into such generic considerations, we will attempt to develop our discussion in the objective field of modern aesthetic analysis. Information theory provides us with precise tools, free of visceral emotional appeals. In this way we can attempt to identify straightforwardly the linguistic and aesthetic characteristics which gave rise to the aforementioned censure, and proceed to locate them and the poetic object which they distinguish in a wider process of formal evolution, as well as in the cultural context from which they derive their necessity and their justification.

Max Bense in his *Theorie der Texte* (1962) introduced, for aesthetic and literary purposes, B. Mandelbrot's theorem on *the informational temperature of a text.*[1] If we take 1 as the highest limit of a text's informational temperature, that temperature, in a given text, will be higher the nearer it is to 1. In such cases, for Mandelbrot "the available words are 'well employed,' even rare words being utilized with appreciable frequencies. Low temperature, on the other hand, means that words are 'badly employed,' rare words being *extremely* rare" (p. 30). Of the first case, Mandelbrot, basing himself on Zipf (1949), gives James Joyce, whose

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1. B. Mandelbrot 1957: 1-78; quotes as indicated in text. [The text is Volume III of an ongoing series directed by Jean Piaget, and contains monographs by L. Apostel and A. Morf, as well as Mandelbrot's study.] Bense's article appears in *Augenblick* 2 (1958), "Klassification in der Literaturtheorie." [TN]

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vocabulary is "quite varied," as the example; of the second, *the language of children.*

It is necessary, however, in order to transpose these concepts into aesthetic terms, that we remember Bense's admonition: Mandelbrot "limited himself to linguistic investigations," that is, his theorem is linked to "documentary or semantic information," to "factual information," and not, therefore, to "aesthetic information" (which is "inseparable from its actual accomplishment"). However, the "statistical-linguistic dimension" he reveals can furnish us an aesthetic indicator, precisely because of what "it says with respect to the text's productive process."

First conclusion: Aesthetically, the concept of informational temperature is not necessarily linked to a criterion for evaluating *good* and *bad* use of words in a text, as it appears in Mandelbrot's linguistic formulation. Rather, Mandelbrot's theorem agrees with an idea of "richness of vocabulary," since he defines the "macroscopic description of the statistics of a text" as "a measure of the potential richness of its vocabulary" (p. 28). However, richness of vocabulary and its stylistic opposite, "simplicity of vocabulary," are not, by themselves, sure indicators of the aesthetic value of a text (see appendix I).

Mandelbrot himself makes this felt, permitting us to suggest a fundamental aesthetic corollary at this point, when he criticizes Zipf for having considered the Joycean example as "the best model at his disposition, because of the length and variety of his works," and for having accepted the informational temperature of Joyce's texts as being the "best estimate" of the "maximum potential number of different words" for all authors, "when, in reality, that value is due to the exceptionally great potential variety of Joyce's text" (p. 30).

Concerning "aesthetic information," it is doubtless true that the degree of "informational temperature" is an element in its accomplishment, an integrating factor in the artistic process which leads to it. The relative intensity or weakness of temperature, separate from any aprioristic norm of merit or demerit, can only be correctly approached when it is considered as a function of the specific creative process to which it contributes. Therefore, it will be factors of an aesthetic order, and not necessarily those of an exclusively linguistic-statistical order, which will involve the need for a higher or lower proportion, a maximum or minimum, in the informational temperature of a given artistic text, such as a poem or a piece of prose. There is, distinct from the linguistic sense, a self-sustaining concept of the "informational temperature of an aesthetic text," decidedly linked to the evolution of forms on the creative plane.

And thus we are ready to pass to the second phase of our study. As an element of contact between both orders of ideas, we will use some remarks of G. A. Miller, another linguist who, in passing, touches on problems which can be applied to aesthetics. Miller focuses on *Basic English,* comparing it with the language of James Joyce. Ogden's *Basic English,* according to Miller, is "an attempt to take advantage of the statistical aspects of language," reducing English to "850 lexical units [. . .] carefully chosen so that by combinations they could be made the equivalent of a much larger vocabulary. [. . .] By reducing the number of word types to

850 lexical units the potential size of the audience is greatly increased." This, of course, makes possible rapid, easily assimilated communication. Ogden himself defines the process: "A reduction may be effected in the number of words that need to be used; i.e., how a given field of reference may be covered with the greatest economy. [. . .] What is really required is, in fact, a scientifically selected vocabulary minimum; and it is this selection that Basic claims to provide." As Miller points out, however, "there has been an artistic and scientific swing in the opposite direction. The desire for verbal diversification in literature is typified by James Joyce." These two aspects of language usage are synthesized by Miller in the following terms: "An increase in the size of the vocabulary is balanced by a decrease in the size of the audience. A decrease in vocabulary is balanced by an increased audience. There seems to be no simple way to have a large vocabulary and a large audience at the same time" (1951:115-116). Evidently, considered in relation to the vocabulary potential of English, Basic English will exhibit, as compared to the texts of Joyce, an extremely low "informational temperature" in Mandelbrot's sense (see appendix II).

Moving to "aesthetic information" and to the "artistic process" which makes it possible, it can be said that the notion of a "high informational temperature of the text" is linked to something like a craftsman's manipulation of poetry and prose. In such a procedure, the creative artist exhausts the possibilities of diversification and nuance in his linguistic arsenal, holding redundancy to a minimum, and elevating to the maximum the number of syntactic-semantic options. Joyce in English literature, and Guimarães Rosa, in Brazilian, exemplify that artistic process, which seems of itself, in each work – or more exactly in the unified work *in progress* – to tend toward the closing of a whole cycle in the craft of verbal invention, putting it at the same time into crisis. The linguistic artifacts of both authors (Joyce's more than Rosa's) acquire a unique quality of highly personal shopwork through the elaborate handling of words and perfectionist refinement of linguistic textures. This is merely a stylistic observation and is in no way an attempt to play down the exceptional importance of these authors in the redimensioning of their respective literatures. Both were instrumental in staking out the limits of a stage of craftsmanship, well captured by Harry Levin (1960): "The novel to end all novels." This statement, which critically summarizes the position of Joyce's work, can also well characterize the correlative if less extreme position which Guimarães Rosa has come to assume in Brazilian literature.

Concrete poetry is included in a different historical and cultural dimension. Its point of departure is the "crisis of verse" generated at the end of the last century by Mallarmé's "Un Coup de Dès." It responds to a notion of literature, not as *craftsmanship* but, so to speak, as an *industrial* process. Its product is a prototype, not the typical handiwork of individual artistry. It tends toward a minimal, simplified language, increasingly objectified, and for that reason, easily and quickly communicated. This presumes that the semantic reactions of the audience have been correctly conditioned toward structure instead of "swarms of inarticulate feelings." Its program is

"the least common denominator" of language, or (paraphrasing Ogden) of an "artistically selected vocabulary minimum" (see appendix III). In this way it coincides with the sense of a progressively technical civilization within which it is postulated.[2] That is why it rejects the airs and graces of craftsmanship – in spite of the seriousness with which it considers the artisan's contribution to the stockpile of extant forms – from the *art of verse* to the elaborate diversification of vocabulary in prose.[3] It has recourse in its turn to factors of proximity and likeness on the graphic-gestaltic plane, to elements of recurrence and redundancy on the semantic and rhythmic plane, to a visual-ideogrammic syntax (when not merely "combinatory") for controlling the flux of signs and rationalizing the sensible materials of a composition. This is how it limits *entropy* (the tendency to dispersion, to disorder, to the maximum informational potential of a system), fixing the informational temperature at the minimum necessary to obtain the aesthetic achievement of each poem undertaken (see appendix IV).

A counterpart of the same problem is the fact that, in detail, in their minuteness both Joyce and Guimarães Rosa, whose extensively crafted macrocosms involve microcosms which are intensively worked and reduced to essences or chains of essences, are much closer to concrete poetry than the whole literature of dreamy hedonistic alienation, the paradigm of which is Surrealism. It is impossible to discern in Surrealism any constructive organization, any semantic system after the manner of the interconnected "complexes of meaning" which Adelheid Obradovic recognizes in Joyce's art, for example, on comparing it with the destructive vanguardisms of this century's beginnings (1934).

It is not by chance that Joyce's portmanteau word, "silvamoonlake" can be considered a concrete unit of composition, it being possible at all times to individualize series of concretions, perfectly defined as such, in his verbal cosmology:

> With Kiss. Kiss Criss. Cross Criss. Kiss Cross.
> Undo lives' end. (*Finnegans Wake*)

The same can be said for Guimarães Rosa: "Os urubus – os, os, os."[4]

At this point the apparent "impoverishment of language" – in reality, reduction and simplification of vocabulary within a syntax, not of the logical-discursive kind, but of the analogical-visual type – which some thought to see in *concrete poetry*, comes to be correctly redefined. This so-called impoverishment, emptied of the naïve pejorative connotations attributed to it only in the heat of argument or in the levity of a less than rigorous observation, comes to assume, analytically and aesthetically, the character of a true "stylistic principle." As such, it is verifiable as a device

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2. This sense is well emphasized by Max Bense (1958c) and elsewhere.
3. "Verse, with its unfolding movement, its cuttings and junctures, has a cultivated nature, unmistakably erudite and discursive" – Mário Pedrosa, Brazilian art critic, comparing concrete poetry and constructive painting.
4. From the short story "Cara de Bronze [Bronze Face]" in *Corpo de Baile*: "The vultures – the, the, the." This literal translation ignores the vowel play in the Portuguese original, which makes it like Joyce's verbal games. In phonetic transcription: [uz urubuz uz uz uz]. [TN]

and worthy – in a successfully achieved concrete poem – to be considered an integrating factor in its generative process. The question thereby is placed in a historical and cultural context, which, notwithstanding the schematic way it has been outlined here, we can leave at this point as an instigating subject for the creative mind (especially for the young generation of poets which still has not been contaminated by petrifying routines). Commitment to past artistic experience only proves fruitful when it leads to the disclosure of the vectorial field of a new sensibility, contemporaneously valid and active.

Appendices

Appendix I

Verbal opulence alone cannot be equated with true artistic achievement. This is the case with Coelho Neto, whose vocabulary is calculated at around 20,000 words.[1] Even if one wanted to see in him a forerunner in the formal handling of texts, the truth is that his notion of stylistic richness was almost always quantitative and not qualitative (revaluative). His erudite use of lexical rarities, archaisms, Lusitanisms, orientalisms, latinisms, etc., for their own sake was purely ornamental, like a decorative and cumulative tapestry reminiscent of the worst Flaubert. (The Flaubert we have in mind here is not the defender of *le mot juste*, to whom Pound traces the whole "colloquial-ironic" line of French Symbolism – Laforgue, etc. – but the exoticist of *Salammbo*.) That is the reason for his debunking at the hands of the Brazilian modernists (1922), and symptomatically, in Oswald de Andrade's basic preface to *Serafim Ponte Grande* (1933), a book which represents a landmark of verbal invention, of qualitative lexical and syntactical manipulation in Portuguese. On the other hand, it is to the verbal *magrezza* of Machado de Assis, whose "informational temperature" would be comparatively low (from Mandelbrot's linguistic point of view), that we owe, in Brazilian literature, the finest examples of textual structuring prior to Modernism. We cite the extreme examples of chapters LV and CXXXIX in *Epitaph of a Small Winner* where punctuation marks alone substitute for words in the best Sternian tradition, conveying a psychological situation perfectly handled from an aesthetic point of view.

Appendix II

Shannon: "Two extremes of redundancy in English prose are represented by Basic English and by James Joyce's *Finnegans Wake*. The Basic English vocabulary is limited to 850 words and the redundancy is very high. [. . .] Joyce on the other hand enlarges the vocabulary and is alleged to achieve a

1. Coelho Neto is a turn-of-century writer from the northern Brazilian state of Maranhão, famous for his luxuriant style, who was quite popular in the pre-modernist epoch. [TN]

compression of semantic content" (1964:56). In Joyce, therefore, redundancy would be minimal. A curious sample of these two directions of English can be studied by means of the parallel between a fragment of "Anna Livia Plurabelle" and its version in Basic English by Ogden. (See Levin 1960: 196-197.) One should keep in mind, however, in order not to distort the terms of this comparison between the "simplest and most complex English, Mr. Ogden's language of strict denotation and Joyce's language of extreme connotation" (Levin 1960: 197), that, while the Joycean text strives for "aesthetic information" and toward "aesthetic achievement," Ogden's Basic English was conceived as an instrument for conversation and practical communication.

Appendix III

The aesthetic possibilities of a method of reducing vocabulary essentials, as developed by Ogden for communicative purposes, are hinted at by Ezra Pound, preoccupied as always with his slogan program *dichten: condensare*, in his preface to Fenollosa's *Chinese Written Character*. There Pound attempts to offer a valid contribution to Basic English by means of the ideogram. The principle of verbification peculiar to written Chinese is emphasized:

"Many of the nouns in the Ogden list of 850 words could very well serve as verbs, thereby giving considerably greater force to that brief vocabulary. [. . .] I suggest also that the limited gamut of actions included by Ogden in this essential vocabulary might be considered almost a declension of a yet briefer set of main root possibilities" (Fenollosa 1936:5). Evidently, a "basic poetry" has its lexical potential not as a function of a reduction in language to facilitate semantic communication, but as a function of the communication of a poetic product for the accomplishment of which this basic concision is a structural principle. Its lexicon, therefore, will be potentially greater, since it is not limited exclusively by a standard of linguistic (denotative) utility, but by a principle of aesthetic functionality, varying from poem to poem, according to the problem to be solved. Pound's *Cantos*, apart from the ideogrammic method of composition, are included in the craftsman's cycle of creativity, and thus offer a high "informational temperature," or more exactly, a high "referential temperature." (His richness is less due to lexical diversification than to referential complexes – to facts, events, characters, cultural contexts, implying a corresponding continuous variation and incorporation in style, from the Dantesque mode to colloquial American, from Provençal *cantabile* to the archaic English of *The Seafarer*, etc.) Pound, however, does come to speak of a *Basic Canto*: "I propose starting a nice lively heresy, to effek, that gimme 50 more words, and I can make Basic into a real licherary and muledrivin' language, capable of blown Freud to hell and gettin' a team from Soap Gulch over the Hogback. You watch ole EZ do a basic Canto" (Letter to Ogden, in Pound 1951:354).

This "basic canto" is implicit in the very ideogrammic macrostructure of the *Cantos*, where discursive language (from which Pound has not completely dissociated himself) is criticized. As the work progresses,

however, along with a stylistic plurality which aspires to monumental craftsmanship, there occurs a parallel fragmentation of discourse. The device of ideogrammic montage invades the microstructure of the composition and – beginning with the *Pisan Cantos* – it can be said that the tension for the *Basic Cantos* constantly shows up in details:

2 on 2
what's the name of that bastard? D'Arezzo, Gui d'Arezzo
notation
3 on 3
chiacchierona the yellow bird
to rest
3 months in bottle
by the two breasts of Tellus
(auctor)

Or:

Hot hole hep cat

Or:

8th day of September
f f
d
g
write the birds in their treble scale
Terreus! Terreus.

Or Even (from *Rock — Drill*):

They who are skilled in fire
shall read tan the dawn.

And from far
il tremolar della marina
chh chh
the pebbles turn with the wave
chh ch'u

The *Cantos*, as a San Francisco practitioner of oral poetry once observed (by way of censure), "end as a complete palimpsest of ideographs" (Ferlinghetti 1956:19).[1]

APPENDIX IV

It is necessary to establish (Bense mentions it only once) that Mandelbrot used Shannon and Weaver's concepts of *information* and *entropy* in developing his theorem of "the informational temperature of the text": "Let us clarify, therefore, that when we speak of *information* it will always be in Shannon's sense of the word, which is precise, because extremely limited" (Mandelbrot 1957:12). In Shannon's theory of information, which is "normative, prescribing how to encode a message, given certain desires and constraints typical of a telegraphic situation" (1957:12), information is "a measure of one's freedom of choice when one selects a message" (Shannon and Weaver 1964:9). In that theory, always related to an *information source*, *entropy* is a "measure of information": "The quantity which uniquely meets the natural requirements that one sets up for 'information' turns out to be exactly that which is known in thermodynamics as entropy" (1964:12). That is to say, the expression *entropy* is related to "the amount of freedom of choice we have in constructing messages" (1964:13), just as "in the physical sciences, the entropy associated with a situation is a measure of the degree of randomness, or of 'shuffledness' if you will, in the situation" (1964:12). *Entropy* always grows, physical systems tend to become increasingly disorganized. Thus, Weaver adds that for a communication source one can say, just as he would also say it of a thermodynamic ensemble: "This situation is highly organized, it is not characterized by a large degree of randomness or of choice – that is to say, the information (or the entropy) is low" (1964:13). It is in that sense, of *maximum de l'information*, that Mandelbrot uses the term *entropy*. We can therefore conclude that a "high informational temperature" means a high degree of chance, and of *entropy*. On the other hand, Wiener sees the informative content of a system as a measure of its degree of organization, and *entropy* as a measure of disorganization, one being the opposite of the other. Thus *informative content* is "essentially a *negative entropy*," while processes leading to a loss of information are strictly analogous to those in which entropy is increased (*Cybernetics*, 1948). In his "Informational Aesthetics" (1958a), Bense uses *information* and *entropy* to some extent in Wiener's sense of the terms. The first is defined as a measure for the "degree of order," characterizing "aesthetic cosmo-processes," where there is an "exceptional, selected distribution of elements," and the second measures the "degree of disorder," characteristic of "physical cosmo-processes." With relation to that aesthetic application, based on cybernetic nomenclature, it seems licit to say that if the limitation of the "informational maximum" in

1. Ferlinghetti's censure derives from his traditional concept of "oral poetry," not linked with the development of vocal techniques in contemporary music. Pound's text, in a way like Mallarmé's, is a true musical score waiting for performing voices.

the production of a text (concrete poem) lowers the "informational temperature" in Shannon's sense (freedom of choice, chance, in relation to the lexical potential of language), it also diminishes *entropy*, and consequently, in Wiener's sense of the term, increases the *organization*, the *negative entropy*, the *informative content* of the system. It is true that Bense in other essays resorts to Shannon's concept of *information* which, as has been seen, is formulated from a different point of view from that of cybernetics. As, for example, when he studies the principle of *repetition* in the work of Gertrude Stein. There Bense defines repetition through the term "redundancy" as "reduction in the total of aesthetic information in the process of its achievement," by means of which "the primitive originality also wanes" making it "thus possible to develop this aesthetic information as a principle of style" (1958b:58). The following text will serve as a sample of the process:

> Money is what words are.
> Words are what money is.
> Is money what words are.
> Are words what money is.

In this case, it is evident that rather than speak of "a reduction in aesthetic information," it would be better to speak of a reduction in "informational temperature" à la Mandelbrot via Shannon, linked to the linguistic (semantic) idea of "richness of vocabulary." As Bense himself indicated elsewhere: "We cannot refrain from observing that concrete painting offers, in reality, little semantic information, but nevertheless relatively high values of aesthetic information (1958a)." This passage seems to support our proposition that there is a concept of "aesthetic informational temperature" (high or low) different from "linguistic or semantic informational temperature" (high or low). This concept can be readily applied to Stein's "exhibit," one of her best, and one which is quite close in its structural articulation to the "combinatory technique" of Eugen Gomringer's "constellations" (Rothenberg 1968):

worte sind schatten	words are shadows
schatten werden worte	shadows become words
worte sind spiele	words are games
spiele werden worte	games become words
sind schatten worte	are shadows words
werden worte spiele	do words become games
sind spiele worte	are games words
werden worte schatten	do words become shadows
sind worte schatten	are words shadows
werden spiele worte	do games become words
sind worte spiele	are words games
werden schatten worte	do shadows become words

The same concept may also be applied as a general rule to *concrete poetry*. If aesthetic information is "information about structure," "informative content" being the structure itself, the richer the former, the richer will be

the latter in the sense of innovation, of inventiveness. Therefore, concrete art by reducing the work "to the aesthetically essential, to the thematics of signs," manifests in a particularly clear way the distinctive feature of aesthetic information. The selection of a structure, the choice among "x" structural possibilities of that one which best renders the particular problem of the poem, will be in the concrete work the Mallarmean moment of creation. This moment organizes and defines, in the sense of an irreversible decision, the raw materials of sensibility, that "torsion du concerté sur l'instant" ("twisting of the contrived upon the instantaneous") in the words of the French composer Michel Fano. The dialectical poles of this decisive moment are reason and chance, intelligence and intuition, rigor and liberty. It implies, not an "abolition" but a *control*, an integration of chance in the compositional process. "The most lucid intellectual work for the clearest intuition" (Pignatari 1975). It is there that the problem of originality is posited. It will no longer be described in terms of a thematics of content but as a *thematics of structure*. (Something altogether different, it must be once again emphasized, is that concrete poets in no way renounce the content of words. The semantic charges of the words selected are working material as important as their sound or their graphic shape, and converge with them toward the articulation of the desired structure.) It will no longer be pertinent, therefore, to speak of a "richness of vocabulary" but of a *richness of structure* which will coincide, in *concrete poetry*, without programmatical contradiction, with the most rigorous simplification and lexical transparency. In that sense, a last observation of Max Bense seems to us to be meaningful, and we transfer it *mutatis mutandis* to *concrete poetry*: "In presenting instruments of perception, eternal objects of that perception such as colors themselves, the measure of information and the measure of redundancy converge to a singular conjunction: both contribute to perception, to presentification. In concrete painting *information* and *redundancy* manifest themselves as mutually integrative, complementary evidences of a single aesthetic fact" (1958d:88).[1] (Originally published in Revista do Livro (Rio), June, 1960.)

REFERENCES

Bense, Max, 1958a. *Aesthetica II* (Baden-Baden: Agis-Verlag).
1958b "Das Existenz-Problem der Kunst," *Augenblick* 1.
1958c "Klassification in der Literaturtheorie," *Augenblick* 2.
1958d "Konkrete Malerei," *Aesthetica III* (Baden-Baden: Agis-Verlag)
1962 *Theorie der Texte* (Köln: Kiepenheuer & Witsch).
Fenollosa, Ernest, 1936. *The Chinese Written Character as a Medium for Poetry* (New York: Arrow Editions).
Ferlinghetti, Lawrence, 1956. *The Pound Newsletter* (Mimeo).
Levin, Harry, 1960. *James Joyce* (New York: New Directions).
Mandelbrot, B., 1957. *Linguistique Statistique Macroscopique*, in: *Etudes d'Epistemologie Génétique*, Vol. III (*Logique, Langage et Théorie de l'Information*) (Paris: Presses Universitaires de France).

1. Bense here refers to the "eternal objects" of Whitehead, such as "colors or color and form relationships."

Miller, G. A., 1951. *Language and Communication* (New York: McGraw-Hill).
Obradovic, Adelheid, 1934. *Die Behandlung der Raumlichkeit im spaeteren Werk des James Joyce* (Marburg).
Pignatari, Décio, 1975. "New Poetry: Concrete," in Campos, et al. *Teoria da Poesia Concreta*, 2nd ed. (São Paulo: Duas Cidades).
Pound, Ezra, 1951. *Letters 1907-1941*, ed. D. D. Paige (London: Faber and Faber).
Rothenberg, Jerome, 1968. *The Book of Hours and Constellations. Poems of Eugen Gomringer* (New York: Something Else Press).
Shannon, Claude E. and Warren Weaver, 1964. *The Mathematical Theory of Communication* (Urbana: The University of Illinois Press).
Zipf, George K., 1949. *Human Behavior and the Principle of Least Effort* (Cambridge: Addison).